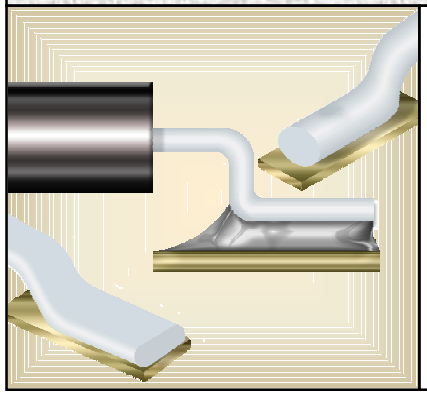
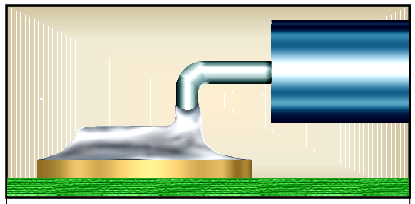


LEADED PACKAGES / PARTS
ROUND OR FLATTENED (COINED) LEADS

This category encompasses discrete component and integrated circuit packages, which share requirements of through hole soldering (NASA-STD-8739.3) and surface mount technology soldering (NASA-STD-8739.2). In typical applications, the leads are formed and bent in a pattern configuration similar to "Gull-wing" devices. Leads may be in the original round cross-section, or flattened to increase surface contact to the land / pad.

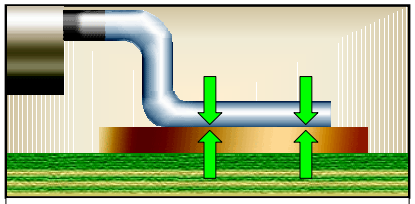
See Section 7.01 "Surface Mount Soldering, General Requirements", for common accept / reject criteria.



PREFERRED

The part is properly oriented to the land pattern, with each lead centered across the width of the land. Lead feet are in full contact with the termination pad, fillets are shiny and concave, and heel fillet is evident.

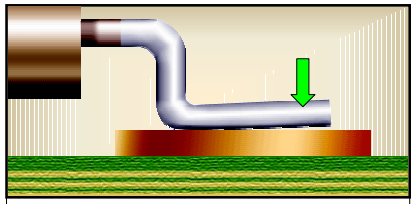
NASA-STD-8739.2 [12.8.1], [12.9.2.a]
NASA-STD-8739.3 [13.6]



PREFERRED
COPLANARITY

The lead's foot should be parallel to, and in full contact with the termination pad.

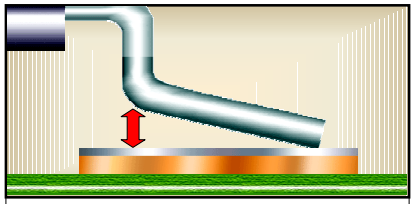
NASA-STD-8739.2 [7.1]
NASA-STD-8739.3 [8.5]



ACCEPTABLE
COPLANARITY

The maximum acceptable variation in planarity between any portion of the lead foot and the termination pad shall not exceed 0.26 mm (0.010").

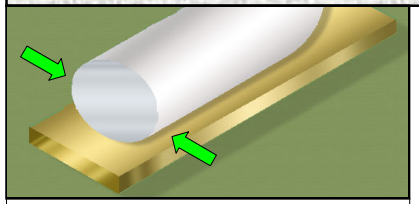
NASA-STD-8739.2 [7.1], [12.8.1.h]
NASA-STD-8739.3 [8.5.1]



UNACCEPTABLE
IMPROPER COPLANARITY

Excessive non-planarity may result in open or mechanically weak solder terminations, excessive part tilt, or violate minimum electrical spacing requirements.

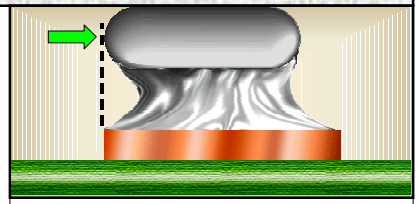
NASA-STD-8739.2 [12.8.2.a.10], [12.9.2.b.3]
NASA-STD-8739.3 [13.6.2.a.5], [13.6.2.a.22]



PREFERRED
LATERAL / SIDE OVERHANG

The component lead is centered on the land, with no lateral / side overhang.

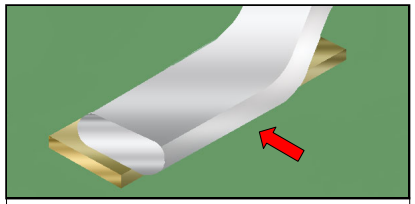
NASA-STD-8739.3 [8.5.1.b]



ACCEPTABLE
LATERAL / SIDE OVERHANG

One edge of the lead may be flush with the edge of the solder pad.

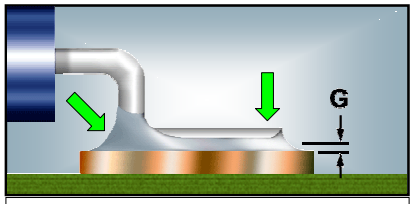
NASA-STD-8739.3 [8.5.1.b]



UNACCEPTABLE
LATERAL / SIDE OVERHANG

The lead shall not overhang the land edge.

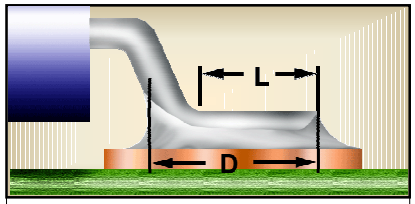
NASA-STD-8739.3 [8.5.1.b], [11.2.5]



ACCEPTABLE
MINIMUM SOLDER THICKNESS (G)

Terminations must have sufficient solder to form a properly wetted fillet, exhibiting a proper heel and toe fillet and a complete side fillet of minimum height.

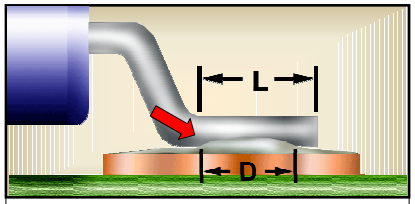
NASA-STD-8739.2 [12.9.2.a.1]
NASA-STD-8739.3 [13.6.1]



ACCEPTABLE
SIDE JOINT FILLET (D)

The side joint fillet (D) shall be present, equal to the lead length (L) plus the heel fillet, and exhibit complete wetting and a positive contour.

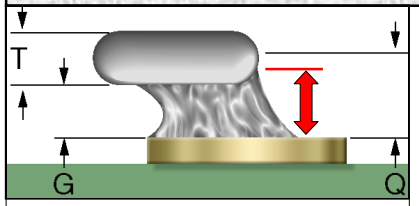
NASA-STD-8739.3 [8.5.1]



UNACCEPTABLE
INSUFFICIENT SIDE JOINT FILLET (D)

The side joint fillet (D) shall be present, equal to the lead length (L) plus the heel fillet, and exhibit complete wetting and a positive contour.

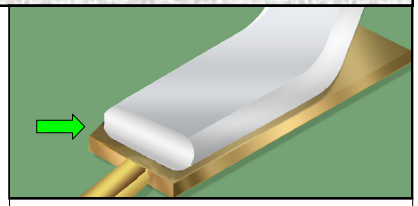
NASA-STD-8739.3 [8.5.1]



UNACCEPTABLE
SIDE FILLET HEIGHT (Q)

The side fillet height (Q) shall be equal to or greater than the minimum solder thickness (G), plus 50% lead diameter / thickness (T). Image also shows side overhang.

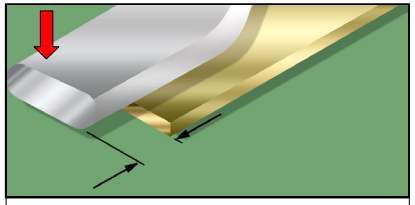
Best Workmanship Practice



MANDATORY
TOE OFFSET

The end of the lead shall be a minimum of 0.25 mm (0.010 in) from the end of the pad. Overhang is prohibited.

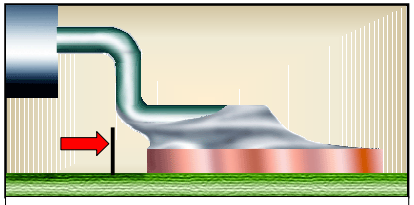
NASA-STD-8739.3 [8.5.1]



UNACCEPTABLE
TOE OVERHANG

Toe overhang is prohibited.

NASA-STD-8739.3 [13.6.2.a.5]

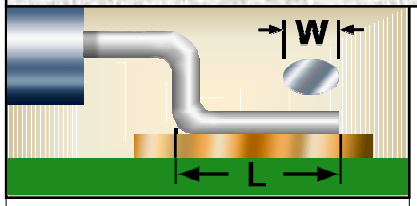


UNACCEPTABLE
HEEL OVERHANG

Heel overhang is prohibited.

NASA-STD-8739.3 [8.5], [13.6.2.a.5], [13.6.2.a.11]

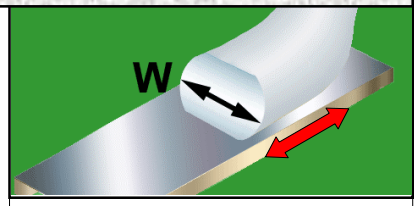
SURFACE MOUNT TECHNOLOGY (SMT)
LEADED PACKAGES / PARTS - ROUND OR FLATTENED "COINED" LEADS (cont.)



ACCEPTABLE
FOOT LENGTH (L)

The foot length (L) shall be a minimum of 3.5 times to 5.5 times the lead diameter / thickness (W), or 1.27mm (0.050 in), whichever is less.

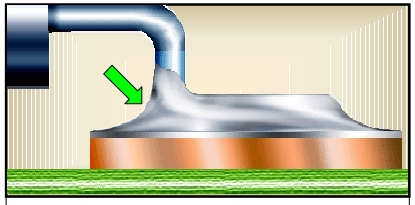
NASA-STD-8739.3 [8.5.1.a]



UNACCEPTABLE
IMPROPER FOOT LENGTH

The foot length shall be a minimum of 3.5 times to 5.5 times the lead diameter (W) / thickness, or 1.27mm (0.050 in), whichever is less.

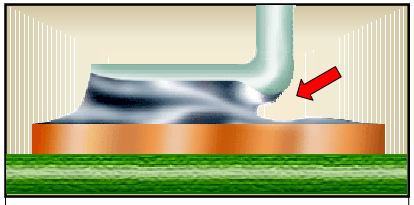
NASA-STD-8739.3 [8.5.1.a]



MANDATORY
HEEL FILLET

A heel fillet is mandatory and shall have a positive contour.

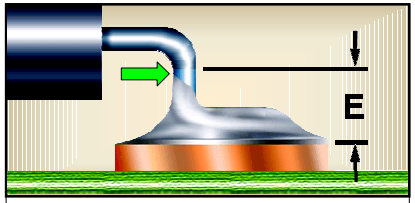
NASA-STD-8739.2 [12.9.2.a.1]
NASA-STD-8739.3 [8.5.1]



UNACCEPTABLE
MISSING HEEL FILLET

A heel fillet is mandatory and shall exhibit a positive contour.

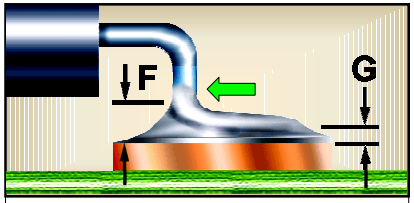
NASA-STD-8739.2 [12.9.2.b.5]
NASA-STD-8739.3 [8.5.1], [11.2.5]



ACCEPTABLE
MAXIMUM HEEL FILLET HEIGHT (E)

Solder may extend through the lower bend radius, but shall not extend into the upper bend radius. Solder shall exhibit a concave fillet and the lead contour shall be visible.

NASA-STD-8739.2 [12.8.1.b], [12.8.2.b.16]
NASA-STD-8739.3 [11.2.5.a]



ACCEPTABLE
MINIMUM HEEL FILLET HEIGHT (F)

Solder shall be equal to the minimum solder thickness (G) plus one (1) lead diameter / thickness. Solder shall exhibit a concave fillet and the lead contour shall be visible.

Best Workmanship Practice